Bangladesh Bank

01. A shop stocks four types of caps, there are 1/3 as many red caps as blue caps and 1/2 as many green caps as red caps. There are equal number of green caps and yellow caps. If there are 42 blue caps, then what percent of the total caps in the shop are blue? (Officer 15)

Solution:

Given that, blue caps= 42
Red caps = 42/3=14
Green caps=14/2=7
Yellow caps=7
Total caps=42+14+7+7=70
Percentage of blue caps= (42/70)×100=60%
Ans: 60%

Alternative Method:

Let, blue caps=x,
red caps=x/3,
green caps=(1/2)×(x/3)=x/6,
yellow caps=x/6
Given that, x=42 which is blue caps
So, red=42/3=14,
green=yellow=42/6=7
∴ Total caps=42+14+7+7=70

In 70 caps, blue caps 42
∴ In 1 cap, blue caps 42/70
∴ In 100 caps, blue caps (42/70)×100
=60
Ans: 60%

02. The annual incomes and expenditures of a man and his wife are in the ratios 5:3 and 3:1, respectively. If they decide to save equally and find a balance of Tk. 4000 at the end of the year, what was their income? (Officer 15)

Solution:

Let, their income be 5x and 3x and their expenditure be 3x and x.
According to the question,
(5x+3x) - (3x + x)=4000
Or, 4x=4000
∴ x=1000
So, Man's income 5x=5×1000=Tk. 5000
and woman's income 3x=3×1000=Tk. 3000
Ans: Tk. 5000 and Tk. 3000.

03. A person sold two articles. Each for the same price of Tk. 1040. He incurs 20% loss on the first and 10% loss on the second. Find his overall percentage of loss. (Officer 15)

Solution:

Let, Price be Tk. 100
At, 20% loss, selling price =100-20=Tk. 80
and at 10% loss selling price =100-10 =Tk. 90
So, cost of 1st item = (1040/80)×100=Tk. 1300
and cost of 2nd item = (1040/90)×100 =Tk. 1155.55
Total cost of two items =Tk. (1300+1155.55)
= Tk. 2455.55

But selling price =1040+1040 =Tk. 2080.
So, loss =Tk. (2455.55 -2080)
=Tk. 375.55
∴ Overall loss percentage = (375.55/2455.55)×100 %
= 15.29%

Ans: 15.29%

04. If the sum of five consecutive integers is S, what is the largest of those integers in terms of S? (Officer 15)

Solution:

Let, consecutive integers are x, x+1, x+2, x+3, x+4.
According to the question,
x+x+1+x+2+x+3+x+4=s.
Or, 5x+10=s
Or ,x=(s-10)/5
Or, x+4=(s-10)/5 +4. [Add 4 both side]
Or, x+4=(s+10)/5.
∴ x+4= s/5+2
∴ The largest integer= s/5+2
Ans: s/5+2

05. The difference between two numbers is five and the difference of their squares is 65. What is the larger number? (Officer 15)

Solution:

Let, Larger number be x and smaller number be y
According to the question,
x-y = 5.....(i)
and, $x^2-y^2=65$ .....(ii)
Or, (x+y) (x-y) = 65
Or, (x+y)×5 =65
∴ x+y = 13.....(iii)
From, (i)+(ii) we get,
2x = 18
∴ x = 9
Putting the value of x in (i)
we get,
9-y =5
∴ y=4
∴ Larger number=9
Ans: 9.

Alternative Method:

Let, the smaller number=x and larger number=x+5
According to the question,
$(x+5)^2-x^2=65$
Or, $x^2+10x+25-x^2=65$
Or, 10x=65-25
Or, 10x=40
∴ x=40/10=4
∴ Larger number=4+5=9
Ans: 9.

06. Robi drove 100 miles to visit a friend. If he had driven 8 miles per hour faster than he did, he would have arrived in 5/6 of the time, he actually took. How many minutes did the trip take? (Officer 15)

Solution:

Let, Robi took x hours to cover 100 miles
Actual speed=100/x mph [mph= Mile per hour]
New speed=(100/x+8) mph
New time taken=x×(5/6)=5x/6 hours.
We know,
Speed× Time=Distance
(100/x+8)×(5x/6)=100
∴ x=5/2
Ans: 5/2 hours=150 min.

07. Of the three numbers, second is twice the first and is also thrice the third. If the average of the three numbers is 44, then what will be the largest number? (Officer 15)

Solution:

Let,1st Number = x, 2nd Number = 2x and 3rd Number = 2x/3
According to the question,
x +2x +2x/3= 44×3
Or, (3x + 6x + 2x)/3= 132
Or, 11x =396
∴ x=36.
So, the largest number is=2×36 =72.
Ans: 72.

08. a, b, c, d, e are 5 consecutive numbers in increasing order, deleting one of them from the set decreased the sum of the remaining numbers by 20% of the sum of 5. Which one of the number is deleted from the set? (BB AD-14, BB AD-12)

Solution:

Let, a=x
As the series is increasing in order of size.
So, b=x+1, c=x+2, d=x+3, e=x+4.
Therefore, the sum of five consecutive numbers is
x+ x+1+ x+2+ x+3+ x+4=5x+10
Again, let the deleted number is Y.
According to question,
(5x+10)-(5x+10-Y)= (5x+10)× 20%
Or, 5x+10-5x-10+Y=(5x+10)× $\frac{20}{100}$
Or, Y=x+2
So, the deleted number is (x+2),
This is the value of "c".

Ans: c

09. A team of 2 men and 5 women completed 1/4th of a job in 3 days. After that another man joined them and they all complete the next 1/4th of the job in 2days. How many men can complete the whole job in 4 days? (BB AD 14)

Solution:

2M & 5W complete in 3 days = $\frac{1}{4}$ part of the job

$\therefore$ " " " " " " 1 day = $\frac{1}{4\times3}$ " " "

= $\frac{1}{12}$ " " "

After joining 1 men,

3M & 5W complete in 2 days = $\frac{1}{4}$ part of the job

$\therefore$ " " " " " " 1 day = $\frac{1}{4\times2}$ " " "

= $\frac{1}{8}$ " " "

$\therefore$ 1 man can complete in 1 day = ($\frac{1}{8}$ - $\frac{1}{12}$) part of the job

= $\frac{1}{24}$ " " "

1 man do $\frac{1}{24}$ parts of the job in 1 day

$\therefore$ 1 man do 1 (whole) " " " = $\frac{1\times24}{1\times1}$ = 24 days

In 24 days the job completed by 1 man

In 1 " " " " " " 1×24 "

$\therefore$ 4 " " " " " " $\frac{24}{4}$ "

= 6 men

Ans: 6 men.

Alternative method:

Suppose Men=M, Women=W

(2M+5W) do 1/4 of a job in 3 days

(2M+5W) do 1 job in 3×4=12 days

So, (2M+5W) in 1day can do 1/12 of a job

Similarly, (3M+5W) in 1 day do 1/8 of a job

So 1 man do in 1 day =($\frac{1}{8}$ - $\frac{1}{12}$)= $\frac{1}{24}$ of the job

$\therefore$ 1man do in 4 days $\frac{1\times4}{24}$ =$\frac{1}{6}$ of the job

now, $\frac{1}{6}$ of the job be done in 4 days by 1 M

so, 1(whole) job be done in 4 days by 6 Men

Ans: 6 men.

10. Rahim bought 2 varieties of rice costing Tk. 5 & 6 per kg each. Then he sold the mixture at Tk. 7/kg, making profit of 20%. What was the ratio of the mixture? (BB AD 14)

Solution:

Let, Rahim bought x kg of rice costing Tk. 5 and y kg of rice costing Tk. 6.

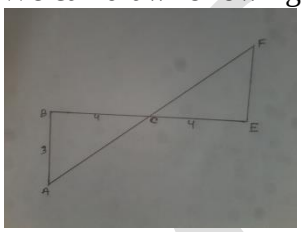
Total cost=5x+6y

And total selling price=7(x+y)

According to question,
(5x+6y)+(5x+6y)×20%=7(x+y)
Or,(5x+6y)+(5x+6y)× $\frac{1}{5}$ =7(x+y)
Or,(5x+6y)(1+$\frac{1}{5}$)=7x+7y
Or, (5x+6y)× $\frac{6}{5}$=7x+7y
Or, 30x+36y=35x+35y
Or, y=5x
Or, x/y=1/5,
So, the ratio is x:y = 1:5 (**Ans)**

<u>Alternative method</u>:
Let, Rahim bought x kg of rice costing Tk 5 and y kg of rice costing Tk 6.
Total cost=5x+6y
And total selling price=7(x+y)
Profit =(7x+7y)–(5x+6y)
= (2x+y) Tk
According to the question,
2x+y=(5x+6y)×20%
Or, 2x+y=(5x+6y)× $\frac{1}{5}$
Or, 10x+5y=5x+6y
Or, 5x=y
Or, x/y=1/5.
So, x:y=1:5 (**Ans)**

11. An Eskimo leaves its igloo and travels 3 km north, then 8 km east and finally 3 km north to reach the north pole. How many kilometers does he have two travels to return to his igloo in a straight line? (BB AD-13)
<u>Solution:</u>
According to the question,
We can draw following figure



Here, ΔABC is a right triangle and the Eskimo has to travel AF.
Now, $AC^2=AB^2+BC^2$
Or, $AC^2=3^2+4^2$
Or, $AC^2=25$
∴ AC=5
AF=2AC=2×5=10
So, 10 kilometers have to travel to return.
Ans: 10 kilometers.

12. A bus is traveling with 52 passengers. When it arrives at a stop, Y passengers get off and 4 get in at the next stop one-third of the passengers get off and 3 get on. There are 25 passengers. Find out how many passengers got off at the first stop? (BB AD 13)

Solution:

According to question,

$52-y+4-\frac{52-y+4}{3}+3=25$

Or, $\frac{3(52-y+4)-(52-y+4)}{3}=25-3$

Or, $2(52-y+4)=22\times3$

Or, $104-2y+8=66$

Or, $104+8-66=2y$

Or, $2y=46$

$\therefore$ Y= 23 Ans.

13. A,B and C do a job alone in 20,30,and 60 days respectively. In how many days can A do the job if he is assisted by B & C? (BB AD 13)

Solution:

In 20 days A can do 1 part job

" 1 " A " " " $\frac{1}{20}$ part of the job

$\therefore$ " 1 " B " " " $\frac{1}{30}$ part of the job

$\therefore$ " 1 " C " " " $\frac{1}{60}$ part of the job

If B and C assist A, then

In 1 day (A+B+C)work = $(\frac{1}{20}+\frac{1}{30}+\frac{1}{60})$ part of the job

$=\frac{1}{10}$ part of the job

With help of B & C, A can do $\frac{1}{10}$ part work in 1 day

" " " " " " 1 (whole) part in 10 days (**Ans**)

14. Two alloys A and B are composed of two basic elements. The ratios of the compositions of the two basic elements in the two alloys are 5:3 and 1:2. A new alloy X is formed by mixing the two alloys A & B in the ratio 4:3. What is the ratio of the composition of the two basic elements in alloy X? (BB AD 12)

Solution:

Let the amount of A be 4x and amount of B be 3x in alloy X,

Since A and B are in the ratio 4:3

Amount of 1st element and 2nd element in A is

$\frac{5}{5+3}\times 4x=\frac{5x}{2}$ and $\frac{3}{5+3}\times 4x=\frac{3x}{2}$

Amount of 1st element and 2nd element in B is

$\frac{1}{1+2}\times 3x=x$ and $\frac{2}{1+2}\times 3x=2x$

so ratio A to B = $[\frac{5x}{2}+x]:[\frac{3x}{2}+2x]$

$=\frac{7x}{2}:\frac{7x}{2}$

= 1:1 (**Ans)**

15. A series has 3 numbers a, ar, ar^2. In the series, the first term is twice of the second term. What is the ratio of the sum of the first 2 terms to the sum of the last 2 terms?
(BB AD 12)

Solution:

According to the question,

Let, the third term is X

So, $ar^2=X$
$ar=2X$
and $a=4X$
Now,
$(a+ar): (ar+ ar^2)$
$=(4X+2X): (2X+X)$
$=6X:3x$
=2:1 (**Ans**)

16. The length of a rectangle is twice its width. If the length is increased by 4 inches and the width is decreased by 3 inches, a new rectangle is formed whose perimeter is 62 inches. What is the length of the original rectangle?
(BB AD 11)
Solution:
Let, width be X inches
$\therefore$ Length be 2X inches.
When the length is increased by 4 inches=2X+4
And the width is decreased by 3 inches=X-3
According to question,
$2\{(2X+4)+(X-3)\}=62$
Or, $2X+4+X-3=62/2$
Or, $3X+1=31$
$\therefore$ X=10
The length of the original rectangle=2×10
=20 inches (**Ans**)

17. Two cars race around a circular track in opposite directions at constant rates. They start at the same point and meet every 30 seconds. If they move in the same direction, they meet every 120 seconds. If the track is 1800 meter long, what is the speed of each car? (BB AD 11)
Solution:
In the opposite direction,
In 30s cars go 1800m
In 1s cars go 1800/30=60m

In the same direction,
In 120s cars go 1800m
In 1s cars go 1800/120=15m

Let, speed of 1st car is X m/s
And speed of 2nd car is Y m/s
According to the question,
X+Y=60……(i)
X-Y=15……(ii)
(i)-(ii)=>
2Y=45
$\therefore$ Y=22.5
(i)=> X+22.5=60
$\therefore$ X=37.5
$\therefore$ Speed of the 1st car=37.5 m/s and 2nd car= 22.5 m/s (**Ans**)

Alternative method:
Let, speed of 1st car is X m/s
And speed of 2nd car is Y m/s

According to the question,
30X+30Y=1800….(i)
120X-120Y=1800…..(ii)
From (i) we get,
∴ X=$\frac{1800-30Y}{30}$ …..(iii)
Put the value of X into equation (ii)
120× $\frac{1800-30Y}{30}$ -120Y=1800
Or, 4(1800-30Y)-120Y=1800
Or, 7200-120Y-120Y=1800
∴ Y=22.5
From equation (iii)=>
∴ X=$\frac{1800-30\times22.5}{30}$
=37.5
∴ Speed of the 1st car=37.5 m/s and 2nd car= 22.5 m/s (**Ans**)

18. A printer quotes a price of taka 7,500 for printing 1,000 copies of a book and Taka 15,000 for printing 2,500 copies. Assuming a linear relationship and 2,000 books are printed, find (a) the variable cost per book, (b) the average cost per book and (c) the fixed cost. (BB AD 11)
Solution:
(a) 1000 copies need 7500Tk
2500 copies need 15000Tk
∴ Extra 1500 copies need 7500Tk
This 1500 copies are fixed cost free,
We can get variable cost per book=7500/1500
=5 Tk (**Ans**)

(b) As cost function is linear and total cost for printing first 1000 copies is 7500Tk and the variable cost for per book is 5 Tk.
So, more 1000 copies cost=5×1000
=5000Tk
To print 2000 books we need=(7500+5000)
=12,500Tk
∴ Average cost=12,500/2000
=6.25Tk (**Ans**)
(c) Fixed cost=(7500-5000)=2500Tk(**Ans**)

19. The area of a rectangular plot is 323 square meters. Its perimeter is 72 meters. Find the length and breadth of the plot. (BB Cash 11)
Solution:
Given that, Area = 323 and Perimeter = 72.
Let, length = x and breadth = y.
According to the question,
2×(x+y) =72
Or, x+y =36
∴ x= 36-y
Again, xy = 323
Or, (36-y)×y = 323
Or, -y^2 +36y = 323
Or, y^2 -36+323 =0
Or, y^2 -19y -17y +323 =0
Or, y(y-19) -17(y-19) =0
Or, (y-19)(y-17) = 0

$\therefore$ y=17,19
Since breadth cannot be more than length,
Here, breadth = 17
Now,
2×(x+17) = 72
Or, 2x = 72-34
$\therefore$ x=19.
Therefore, length = 19 & breadth = 17 (**Ans**)

20. Mr. Hasan has few notes of Tk. 10 and Tk. 50. A total of his 150 notes amount to Tk.5100. What is the number of each kind of note? (Cash 11)
Solution:
Let, the number of 10 taka notes be x
And the number of 50 taka notes be (150-x)
According to the question,
10x+50(150-x)=5100
Or, 10x+7500-50x=5100
Or, -40x=-2400
Or, 40x=2400
$\therefore$ x=60
The number of 10 Tk. Notes=60 and the number of 50Tk. notes=150-60=90 (**Ans**)

21. The length of rectangular plot is greater than its breadth by 20 meters. If the perimeter of the plot is 160 meters, what is the area of the plot in square meters? (Cash 11)
Solution:
Let, breadth be x meters and length be (x+20) meters
So, perimeters=2(x+x+2)=(4x+40) meters.
According to the question,
4x+40=160
Or, 4x=160-40
$\therefore$ x=30
$\therefore$ Breadth=30 meters and length=30+20=50 meters.
$\therefore$ Area of the pot=(50×30)=150 sq. meters. (**Ans**)

22. Tanim bought some oranges. He gave 1/2 of them to his sister,1/4 of the remainder to his neighbor, 3/5 of those left to his children and had 6 left in the end. How many oranges did Tanim buy? (BB AD 10)
Solution:
Let, Tanim bought = 40x oranges. [Multiplication of Denominator 2, 4 & 5]
Gave to sister = 40x×(1/2)=20x.
Remaining=40x-20x=20x.
Gave to neighbor=20x×(1/4)=5x.
Remaining=20x-5x=15x.
Gave to children=15x×(3/5)=9x.
Remaining=15x-9x=6x.
According to the question,
6x = 6
$\therefore$ x = 1.
Therefore total oranges = 40×1=40 (**Ans**)

23. Three partners A, B & C start a business. Twice the investment of A is equal to thrice the capital of B is 4 times the capital of C. They share the profit in the ratio of their capital. In a particular year, the gross profit is Tk. 250000 and the administrative expenses are 20 % of the gross profit. Find the share of profit each partner. (BB AD 10)

Solution:

let, capital of C= Tk. X

capital of B= Tk. 4X

and capital of A= Tk. $\frac{4X\times3}{2}$=Tk. 6X

Ratio of three capital, A:B:C =6X:4X:X=6:4:1

Sum of the ratio=6+4+1=11

So, profit ratio=6:4:1

∴ Sum of the ratio=6+4+1=11

Profit excluding Administrative expenses=250000-250000×20%

=2,00,000

A's share of profit = 2,00,000×$\frac{6}{11}$

= Tk. 1,09,090.

B's share of profit = 2,00,000×$\frac{4}{11}$

= Tk. 72,727..

C's share of profit = 2,00,000×$\frac{1}{11}$

= Tk. 18,183. (**Ans**)

24. A boy purchased some chocolates from a shop for Tk 120. In the next shop he found that the price of per piece chocolate is Tk 3 less than that charged at the previous shop, as such he could have purchased 2 more chocolates. How many chocolates did he buy from the first shop? (BB AD 09)

Solution:

Let, he bought X numbers of chocolates.

So, price for each chocolate= $\frac{120}{x}$ Tk

On the next shop price for each chocolate =($\frac{120}{x}-3$)

According to the question,

($\frac{120}{x}-3$)= $\frac{120}{x+2}$

Or, $\frac{120-3x}{x}$= $\frac{120}{x+2}$

Or, 120x=(x+2)(120-3x)

Or, 120x= 120x-3x^2+240-6x

Or, 3x^2+6x-240=0

Or, 3(x^2+2x-80)=0

Or, x^2+10x-8x-80=0

∴ (x+10)(x-8)=0

So, x=8

∴ He bought 8 chocolate.

25. A loss of 15% is incurred by selling a watch for Tk. 612. How much is the sum of money by which it is sold to make a profit of 10%? (BB AD 09)

Solution:

Let, cost = 100 Tk.

At 15% loss selling price becomes=85Tk.

Therefore, the cost of watch = (612×100)/85

= 720 Tk.

Now, at 10% profit Selling price becomes=110 Tk.
So, the selling price= 110% of 720
=(110×720)/100
=792 Tk (**Ans**)

26. Recently Kamal's hourly wage has been increased by 10%. Before this increase, Kamal's total weekly wage was Tk. 137. If his weekly working hours were to decrease by 10% from last week's total working hours, what would be the change, if any, in Kamal's total weekly wage? (BB AD 09)
Solution:
Let, weekly working time=x hr
Weekly hourly wage=137/x Tk.
After 10% increase,
New hourly wage=137/x+10% of (137/x)
=1507/10x
After 10% decrease,
New working hour=x-10% of x
=9x/10

New weekly total wage=(9x/10)×(1507/10x)
=135.63 Tk.

∴ Weekly wage reduced=137-135.63=1.37 Tk. (**Ans**)

Alternative Method:
Given that, Last week's wage was 137 Tk.
At 10% increase in wages it becomes = 137×110%
= 150.7 Tk.
Let, last week's working hour was 10.
At 10% decrease it becomes 10×90%
=9 hours.
Total wages of last week =137×10=1370 Tk
Total wages of this week = 150.7×9=1356.3 Tk.
Change =1356.3 -1370 = -13.7 Tk
So, percentage change = (-13.7×100)/1370
= -1%
Therefore, the change is 1% less wages. (**Ans**)
Or, weekly wage reduced=1% of 137=1.37Tk. (**Ans**)

27. Mr. Rahim pays 10% tax on all income earned over 60000Tk but he does not pay any tax on interest on saving certificate. In 2006 he paid 7500 as tax & he earned 12000 as interest on savings certificates. What is his total income in 2006? (BB AD 08)
Solution:
Mr. Rahim gives 10% taxes upon his income.
so,
If tax is 10Tk then income is 100Tk
If tax is 7500Tk then income is (7500×100)/10
= 75000Tk
His total income=75000+60000+12000
= 147000Tk (**Ans**)

28. A man deposits Tk. 1000 in a bank at 8% interest rate compounded annually. At the end of the 3rd year, what will be the total amount including interest? (AD 08)
Solution:

Here, principal value, P=Tk. 1000
Rate of interest, r=8%= 0.08
And number of years, n=3

We know, $FV=P(1+r)^n$
$= 1000(1+0.08)^3$
$=1259.712$
∴ Including interest the total amount will be 1259.712 Tk (**Ans**)

29. A trader, while selling an item, was asking for such a price that would enable him to offer a 20% discounts and still make a profit of 30% on cost. If the cost of the item was Tk.50 what was his asking price? (BB AD 08)
Solution:
Given that, cost = 50 Tk.
At 30% profit,
Price becomes =(50×130)/100 = 65 Tk.
Now, Let, cost = 100 Tk.
At 20% discount price = 80 Tk.

When asking price is 80 Tk cost is 100 Tk
When asking price is 1 Tk cost is 100/80 Tk
When asking price is 65 Tk cost is (100×65)/80 Tk
= 81.25 Tk (**Ans**)

30. Mr. Zaman won an election where the ratio of his votes and those of his opponent, Mr. Yunus, was 4:3.The total number of voters was 581, of which 91 did not vote. Calculate the margin of votes by which Mr. Yunus was defeated? (BB AD 06)
Solution:
Ratio of Mr. .Zaman and Mr. Yunus = 4:3
Sum of the ratio = 4+3 = 7
Total number of voters = 581
Voter who apply their votes = 581 – 91 = 490
Mr. Zaman got = 490 ×(4/7) = 280
Mr. Yunus got = 490 ×(3/7) = 210
The margin of votes = 280 – 210 = 70 (**Ans**)

31. A square office, 1000 feet by 1000 feet, is to be partitioned into two offices by a single interior wall. The difference between the perimeters of the resulting two officers is be 400 feet. What are their dimensions? (BB AD 06)
Solution:
Let, one side after partition=x and other side=1000-x
According to the question,
2(1000+x)-2(1000+1000-x)=400
Or, 2000+2x-4000+2x=400
∴ x=600
So other side after partition=1000-600=400 ft
∴ Dimensions of 1st office=1000×600=600000 sq. ft.
∴ Dimensions of 2nd office =1000×400=400000 sq. ft. (**Ans**)

Alternative method:
Since this is square and it partitioned by a single wall, the Length of two offices will remain same = 1000 feet.

But the width of these two offices will change.
Since perimeter includes width of two sides, the difference of two sides = 400 but one side = 400/2 = 200 feet.
Let, width of large office = x and that of small office = 1000-x.
According to the question,
x-(1000-x) = 200
Or, 2x = 1200
∴ x = 600.
So width of large office =600 and that of small office =1000-600 = 400.
So the dimension of large office= 1000×600 = 600000 sq feet
Small office = 1000×400 = 400000 sq feet (**Ans**)

32. The sum of the pay of two officers is Taka 24,000 per month. If the pay of one officer is decreased by 9% and the pay of the second is increased by 17%, their pays become equal. Find the pay of each officer. (BB AD 06)

Solution:

Let, the pay of one officer = x taka
The pay of second officer = (24000 – x) taka
At 9% decrease,
The pay of one officer become =x–9% of x
=x-9/100x
= 91x/100
At 17% increase,
the pay of second officer become=(24000–x)+17% of (24000–x)
$= \frac{117\times(24000-x)}{100}$
According to the question,
$91x/100 = \frac{117\times(24000-x)}{100}$
Or, 91x= 117×(24000 – x)
Or, 91x= 117×24000 – 117x
Or, 91x+117x= 117×24000
Or, 208x= 117×24000
Or, x= (117×24000) /208
∴ x= 13500
Pay of one officer = 13500 Taka
Pay of second officer =24000 – 13500
= 10500 Taka (**Ans**)

33. Abir can do a piece of work in 80 days. He works for 10 days and then Basher alone finishes the rest of the work in 42 days. How much time would it take for the two of them together to complete the whole work? (BB AD 06)

Solution:

Let, the whole work = 1
In 80 days, Abir can do 1 work
In 1 day,……..(1/80) part of the work
In 10 days…….(1×10)/80 part of the work
=1/8 part of the work
Rest of the work = 1–(1/8)= 7/8 part of the work
Now, In 42 days, Bashir can do 7/8 part of the work
In 1 day, Bashir can do (7/8)×42part of the work
=1/48 part of the work
In 1 day, Abir and Bashir together can do = (1/80+1/48) part of the work
= (3+5)/240

= 1/ 30 part of the work

So, they can do 1/30 works in 1 day

∴ They can do 1 works in 30/1= 30 days. (**Ans**)

34. A Group of students has hired a bus for Taka 3000 for going to a picnic. They had an understanding that each participant would share the charge in equal amounts. But because of 10 students not turning up, the charged per student increased by Taka 10 over the initial estimates. What was the number of students who originally registered for the picnic? (BB AD 06)

Solution:

Let, total number of students who registered was x.

So, the charge for the picnic = Tk 3000/x.

but 10 students did not turn up.

∴ Students went to picnic=(x-10).

so, increased charge for the picnic =Tk 3000/(x-10).

According to the question,

3000/x-3000/(x-10)=10

Or, 3000x-3000x+30000=10x(x-10)

Or, $10x^2$-100x-30000=0

Or, x^2-10x-3000=0

∴ x=60, -50 (number of students cannot be negative)

∴ Total number of students who registered for the picnic was 60. (**Ans**)

35. Karim and Rahim have equal amount of money. Radha has half of Rahim's money and Amena has half of Radha's money. If you add one taka with all the money they have, it will be Tk.100.How much Rahim has? (BB AD 04)

Solution:

Let, Amena has = x Tk..

So, Radha=2x Tk. , Karim and Rahim = 4x Tk.

According to the question,

(x+2x+4x+4x)=(100-1)

Or, 11x=99

∴ x=9.

So, Rahim has= 4×9=36 Tk (**Ans**)

36. Find the value of 'x' if $(2x^2-1) = (3x^2-2x)$ (BB AD 04)

Solution:

Given that, **$(2x^2-1) = (3x^2-2x)$**

Or, 2x-1= $3x^2$-$2x^2$

Or, 2x-1= x^2

Or, x^2 -2x+1=0

Or, $(x-1)^2$ =0

Or, x-1=0

∴ x=1 (**Ans**)

37. Find the value of 'a' if (a-3) = 10/a (BB AD 04)

Solution:

Given that, (a-3) = 10/a

Or,a^2-3a=10

Or, a2-3a-10=0

Or, a^2-5a+2a-10=0

Or, a (a-5) +2(a-5) =0

∴ (a-5) (a+2)=0

∴ a=5 or, a=-2 (**Ans**)

38. At 8:00 A.M a car stared from Dhaka towards Cox's Bazar at a speed of 50 km/hr. After one hour, another car started from Dhaka towards Cox's Bazar at a speed of 60 km/hr. After how much time and at what distance from Dhaka the second car will overtake the first car? (BB AD 04)

Solution:

Given that, 1st car started at 8 am
2nd car started at 9 am
In 1 hour, 1st car will be 50 km ahead
Difference of speed = 60-50 =10 km
2nd car will overtake after (50/10) or 5 hours
In 5 hours the second car will go = (5×60) or 300 km (**Ans**)
Again, 2nd car started its journey at 9 pm, so it will overtake the 1st car 9am+5h = 2 pm (**Ans**)

Alternative method:

Let, 2nd car overtake 1st car after x hours
According to the question,
60x=50x+50
Or, 60x-50x=50
Or, 10x=50
∴ x=5
So 9am+5h=2 pm (**Ans**)
Distance covered=60×5=300 km (**Ans**)

39. A person wishes to accumulate Tk. 5,00,000 by the end of 15 years by making equal half-yearly deposits over the next 15 years. If he/she earns 10% on the investment, how much must he/she deposit at the end of each half year? (BB AD 04)

Solution:

Here, FV(future value)=5, 00,000 Tk.
i(interest rate)= 10%,
Effective interest rate =(10%)/2 =.05
n(time)= 15 ×2=30
A(Annuity)= ?

We know,
$FV=A\times\frac{(1+i)^n-1}{i}$
Or, $5,00,000=A\times\frac{(1+0.05)^{30}-1}{0.05}$
Or, 5,00,000=A×66.44 [using calculator]
∴ A=7525.59
Ans: He/she must deposit at the end of each half-yearly 7525.59 taka

40. The simple interest rate of a bank was reduced to 5% from 7%. As a consequences Mr. B's income was reduced by Tk. 2100 in 5 years. How much is Mr. B's initial deposit in the bank? (BB AD 01)

Solution:

The rate of interest rate reduced= 7% - 5% = 2%
In 5 years interest reduced=2100 Tk
In 1 year interest reduced = 2100/5=420 Tk

Tk.2 reduce when deposit Tk. 100
Tk. 1 " " " 100/2
Tk.420 " " " (100×420)/2

=21,000 Tk (**Ans**)

41. One fifth of the products made by a company are defective. Four-fifth of the defectives was rejected and one-twentieth of the products were rejected by mistake. What percent of the products sold by the company is defective? (BB AD 01)

Solution:

Suppose total product=100.
Total defective products=100/5=20
Defective product rejected=20×(4/5)=16
Remaining defective product =4
Rejected by mistake=80×(1/20)=4
Products left=100-16-4=80
Defective in 80 products is 4
Defective in 100 products is (4×100)/80=5
Ans: 5%

42. Mr. A purchased a house for Tk. 1000000 in 1995, he spent Tk. 100000 for routine maintenance & upkeep of the house. 1n 1999 he sold the house for 25% of more then what he paid for it. He paid 5% of the proceeds as gain tax & he has to pay 50% of his net profit to the broker, what is his net income? (BB AD 01)

Solution:

Here, purchasing cost + routine maintenance & upkeep cost
= (10,00,000+1,00,000)=11,00,000 Tk
Profit gained at 25% on cost =(11,00,000×25)/100
=2,75,000 Tk
Tex paid at 5% on sales proceeds=2,75,000×5%
= 13,750 Tk
Net profit=(2,75,000–13,750) Tk
= 2,61,250 Tk
Net income after deducting broker's commission
=261250×50%
= 1,30,625 Tk (**Ans**)

43. Mr. X, a sales person earns 5% commission on all sales between Tk.20000 and 40000 and 8% on all sales exceeding Tk.40000 in a month. He does not earn any commission if sales in a month amount to less than Tk. 20000. His monthly salary is Tk.60000,he has to pay tax 20% tax on his basic salary ,but no tax on commission ,in April 2001,the total net income (salary +commission) of the sales person was Tk 65000. How much were the sales in April? (BB AD 01)

Solution:

Tax on salary = 60000×20%=12000
Net salary = 60000-12000=48000
Commission =65000-48000=17000
Let the sales in April=x
According to the question,
40000×5%+(x-40000)×8% =17000
Or, 2000+0.08x-3200 =17000
Or, 0.08x-1200=17000
Or, 0.08x=18200
∴ x=227500
So, the sales in April=Tk. 227500 (**Ans**)

44. A trader sells on an average 18 pencils and 12 pens per day. The profit comes from pencil is 1/3 times the profit made by selling a pen. If he makes a profit of Tk 900 in a month by selling pencils, how much profit does he make per month by selling pens? The trader sells 30days in a month. (BB AD 01)

Solution:

The total no. of sold pencil in a month=30×18=540
The total no. of sold pen in a month=30×12= 360
Total profit 900Tk by selling pencil in a month.
540 pencil make profit 900Tk
∴ 1 " " " " 900/540=5/3
As a pen is 3 times profitable than pencil,
the profit from a pen=$\frac{5}{3}$×3=5Tk
So, the total profit by selling pens per month=360×5
=1800Tk.
Ans: 1800Tk

45. A total of 50 employees work in a bank branch of these 22 have taken the accounting course, 15 have taken finance, 14 marketing, 9 of them taken exactly 2 of the courses, 1 of them has taken all. How many of the 50 employees have taken none of the course?
(BB AD 01)

Solution:

Here, one of the employees has taken all of the courses
and nine of the employee have taken exactly 2 of the courses

Number of employee have taken only Accounting
=22–(9+1)
=12
Numbers of employee have taken only Finance
=15–(9+1)
=5
Numbers of employee have taken only Marketing
=14–1=13

Numbers of total employee have taken 1, 2 or 3 courses
=12+5+13+9+1=40
So, employees who have not taken any course=50–40
=10 (**Ans**)

46. In an organization 30% of all employees live over 10miles away from the place of work & 60% of worker who live who live over 10miles use company transport. If 40% of employees of the company use company transport, what percent of the employees live 10miles or less from work and use company transport? (BB Officer 01)

Solution:

Let total employees = 100,
employees live over 10 miles = 30
So, employees live in 10 mile or less = 100 – 30 = 70
Total 40% or 40 employees use transport.
Now, employees live over 10miles using transport
=60% of 30
= (60×30)/100
= 18
So, Company employees who use transport live in 10miles or less ten miles=40–18=22.

So, percentage of using transport of employee who live in 10miles or less = (22×100)/70 =$31\frac{3}{7}$ % (**Ans)**

47. Mr. Reach sold two properties P1 & P2 for Tk 50000 each. He sold property P1 for 20% more then what he paid for it & sold P2 less than 20% what he paid for it. What was his total gain or loss, if any, on the scale of two properties? (BB Officer 01)

Solution:

At 20% Profit of P1,

When selling price Tk. 120 the cost Tk. 100
" " " " 1 " " 100/120
" " " " 50,000 " " $\frac{100\times50000}{120}$
$=\frac{125000}{3}$ Tk

At 20% less of P2,
When selling price Tk. 80 the cost Tk. 100
" " " " 1 " " 100/80
" " " " 50,000 " " $\frac{100\times50000}{80}$
=62,500Tk

Total cost=$\frac{125000}{3}+62,500$
= 1,04,166.67 Tk
Total selling price =50,000×2
=1,00,000Tk
Total=1,04,166.67-1,00,000
=4,166.67 Tk (**Ans**)

48. A trade while selling an item was asking for such a price that would enable him to offer a 10% discount and still make a profit of 20%. If the cost of the product was Tk 50, what was his asking price? (BB Officer 01)

Solution:

If the cost price was 50Tk
then at 20% profit selling price is =50 + 50×20%
=60Tk
Again at 10% discount,
If the selling price is 90 then asking price is 100
" " " " " 1 " " " " 100/90
" " " " " 60 " " " " $\frac{100\times60}{90}$
= 66.67
Ans: The asking price is 66.67Tk.

49. Mr. X pays 10% tax on all income over 60000Tk but he does not pay any tax on interest on postal saving certificate. In 2000 he paid 7500 as tax & he earned 12000 as interest on postal savings account. What is his net income in 2000? (BB Officer 01)

Solution:

Mr. X gives 10% taxes upon his income.
so,
If tax is 10Tk then income is 100Tk
If tax is 7500Tk then income is (7500×100)/10
= 75000Tk

His total income=75000+60000+12000
= 147000Tk
∴ Net income= 147000–7500=139500Tk **Ans.**

50. Mr. X has a investable amount of Tk 100000, he will invest the amount for two years. He has two options. He can invest at simple interest rate of 12% per annum; alternatively he can invest at compound rate of 10% (compounded semi annually). Calculate the earnings at two option and advice him accordingly. (BB Officer 01)

Solution:

At 12% simple interest,
Mr. X can get, I=npr
=(2×1,00,000×12%)
=24,000Tk
At 10 compound amount= $P(1+r)^n$
=1,00,000$(1+10\%)^4$ (n=4 because of semi annually)
= 121550.6Tk
∴ Compound interest = 121550.6–100000
=21550.6Tk
So, simple interest is better for Mr. X (**Ans**)

51. A candidate answered all 22 questions in a test & received 63.5 marks. If the total marks were derived by adding 3.5 marks each correct answer and deducting 1 mark for each incorrect answer, how many questions did the student answer incorrectly? (BB Officer 01)

Solution:

If all the answers were right he might got = 22×3.5=77
So, his deducted number is =77–63.5 = 13.5
Number deducted for each wrong answer = 1+3.5 = 4.5
Total no. of given wrong answer = 13.5/4.5 = 3 (**Ans)**

Alternative method:

Let, no. of incorrect answer = X,
so correct answer = 22 - X
3.5×(22-X)-1×X=63.5
Or, 77-3.5X-X= 63.5
Or, -4.5x = 63.5-77
∴ x =3
So, incorrect answer was 3 (**Ans**)

52. The percentage profit earned by selling an article for Tk 1920 is equal to the percentage loss incurred by selling the same article for Tk 1280.At what price should the article be sold to make 25% profit. (AD(ff) 15)

Solution:

Let, amount of profit be x and loss be x
According to the question,
1920-x=x-1280
Or, 2x=3200
Or, x=3200/2
∴ x=1600
∴ At 25% profit, new selling price=1600+25% of 1600=2000 Tk

Ans: 2000Tk.

Alternative Method:

Let, profit and loss = x %.

$\frac{1920}{(100+x)} = \frac{1280}{(100-x)}$

Or, 128,000+1280x=192,000-1920x

Or, 1280x+1920x=192,000-128,000

Or, 3200x=64,000

∴ x = 20

Cost price= Tk 1920/(100+20)

=Tk 1600

∴ At 25% profit, Selling Price= Tk. 1600+25% of 1600

= Tk. 2000

Ans: 2000Tk.

53. A can do a work in 10 days, while B alone can do it in 15 days. They work together for 5 days and rest of the work is done by C in 2 days. If they get Tk 4500 for whole work, how should they divide money? (AD(ff) 15)

Solution:

A does in 1 day = 1/10 portion,

So, in 5 days = ½ portion

Similarly, B does in 1 day=1/15 portion

∴B does in 5 days=1/3 portion

In 5 days (A+B) work = ½+1/3 = 5/6 portion

So, in 2 days C does work= 1–5/6 = 1/6 portion

Now,

Share of A =4500×(1/2)=2250 Tk

Share of B = 4500×(1/3)=1500 Tk

Share of C = 4500×(1/6)=750 Tk (**Ans**)

54. The average age of students of a class is 15.8 years. The average age of boys in the class is 16.4 years and of the girls is 15.4 years. Find the ratio of number of boys to the number of girls in the class. (AD(ff) 15)

Solution:

Let, the number of boys be 'x' and girls be 'y'.

∴ Total students= x+y

According to the question,

16.4x+15.4y= 15.8(x+y)

Or, 16.4x+15.4y=15.8x+15.8y

Or, 16.4x-15.8y=15.8y-15.4y

Or, 0.6x=0.4y

Or, x/y=0.4/0.6

∴ x:y=2:3

∴ The ratio is 2:3. (**Ans.**)

55. A bus hired at the cost of Tk. 2400 and it was decided that every student would share the cost equally. But 10 more students jointed and as a result the fare decreased by Tk. 8 per person. How many students were travelling in the bus? (AD(ff) 15)

Solution:

Let, initially students be 'x' and finally travelled (x+10).

According to the question,

$\frac{2400}{x} - \frac{2400}{x+10} = 8$

Or, $\frac{2400(x+10)-2400x}{x(x+10)} = 8$

Or, $\frac{2400x+24000-2400x}{x^2+10x} = 8$

Or, $\frac{24000}{x^2+10x} = 8$

Or, $8(x^2+10x)=24000$

Or, $x^2+10x=3000$

Or, $x^2+10x-3000=0$

Or, $x^2+60x-50x-3000=0$

Or, $(x+60)(x-50)=0$

∴ x= 50. [x=-60, not acceptable]

So, finally travelled= 50+10 =60 Student. (**Ans.**)

56. If $(x + \frac{1}{x}) = 3$, then the value of $(x^6 + \frac{1}{x^6}) = ?$

Solution:

Given,

$(x + \frac{1}{x}) = 3$

Or, $(x + \frac{1}{x})^2 = 3^2$ [Square both side]

Or, $x^2+2.x.\frac{1}{x} + \frac{1}{x^2} =9$

Or, $x^2+2+ \frac{1}{x^2} =9$

Or, $x^2+ \frac{1}{x^2} =9-2$

Or, $x^2+ \frac{1}{x^2} =7$

Or, $(x^2+ \frac{1}{x^2})^3 =7^3$ [cube both side]

Or, $(x^2)^3+ (\frac{1}{x^2})^3+ 3. x^2. \frac{1}{x^2}(x^2+ \frac{1}{x^2})=343$

Or, $x^6 + \frac{1}{x^6}+3.7=343$ [Because, $x^2+ \frac{1}{x^2} =7$]

Or, $x^6 + \frac{1}{x^6} =343-21$

∴ $x^6 + \frac{1}{x^6} =322$ (**Ans.**)